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(54) ELECTRICAL SWITCHBOARD STRUCTURE
(71) BARKER & TAYLOR PTY. LTD.
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13 132/55 204 011 04.2

(57) Claim 1. An electrical switchboard structure comprising a casing structure having at least one open-fronted compartment; a door to cover the front of the compartment and thereby to close the compartment;

resilient sealing means fitted to the door so as to engage the casing structure about the mouth of the compartment whereby to seal the compartment when closed by the door;

casing flange means fixed relative to the casing structure to extend around the mouth of the compartment and to project forwardly therefrom; and

door flange means projecting inwardly of the door such that, when the door is closed, the door flange means extends around the mouth of the compartment in closely spaced, overlapping relation with the casing flange means between said sealing means and the compartment whereby to shield, in use, the sealing means from direct exposure to flame or hot gases generated when an electrical explosion occurs within the compartment.

COMPLETE AFTER PROVISIONAL SPECIFICATION No. 45167/79.

(Note: This is a comprehensive form, and parts inappropriate to a particular application should be deleted. It may be signed by the applicant or by the Australian Patent Attorney. No legalisation is necessary.)



APPLICATION ACCEPTED AND AMENDMENTS
2-1-1982

Forms 1, 2, 4 and 5

24

ALLOWED

COMMONWEALTH OF AUSTRALIA
Patents Act 1952-1962

INSTRUCTIONS

CONVENTION OR NON-CONVENTION APPLICATION FOR A
PATENT OR PATENT OF ADDITION

45167/79

(a) Insert full name(s) of applicant(s).

I/We (a) BARKER & TAYLOR PTY. LTD.

(b) Insert full address(es) of applicant(s). (NOT P.O. Box number).

of (b) 26-36 High Street, Northcote,
in the State of Victoria,
Commonwealth of Australia

(c) Delete whichever is inapplicable.

(d) Insert title of invention.

hereby apply for the grant of a (c) patent/~~patent of addition~~ for an invention entitled
(d) "ELECTRICAL SWITCHBOARD STRUCTURE"

which is described in the accompanying (c) provisional/~~complete~~ specification.

(e) Delete entirely if (e) inapplicable.

I/We request that the patent may be granted as a patent of addition to
(c) { the patent applied for on application No. } in the name of
patent No. }

(f) Delete entirely if (f) convention priority NOT claimed.

(g) Insert number of first basic application.

(h) Insert country in which first basic application was made.

(i) Insert date of first basic application.

No. (g)	in (h)	on (i)	19
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I/Our address for service is care of CLEMENT HACK & CO., Patent Attorneys,
~~140 William Street~~ Melbourne, Victoria, Australia.
140 William Street,

(j) Insert date.

(k) Signature(s) of applicant(s). If a company, to be executed in a manner binding on the Company according to its Articles of Association or the laws of the country.

(l) Seal of the Company (if any).

(j) Dated this

24th

day of

APRIL,

1978

(k)

BARKER & TAYLOR PTY. LTD.

CLEMENT HACK & CO.

To: The Commissioner of Patents,
Commonwealth of Australia.

CLEMENT HACK & CO., Patent Attorneys, XXXX Street, Melbourne, Australia.
PE/App./9/75 140 William

COMPLETE SPECIFICATION

(ORIGINAL)

45167/79

FOR OFFICE USE

Application Number:
Lodged:

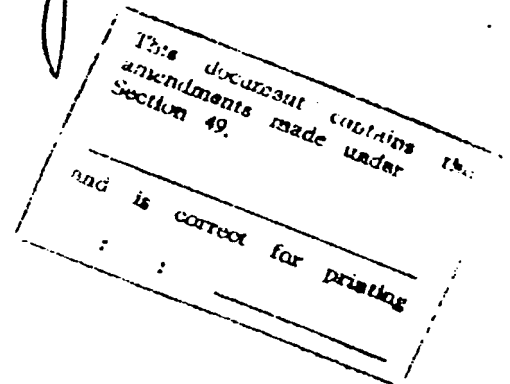
Complete Specification Lodged:
Accepted:
Published:

Priority:

Related Art:



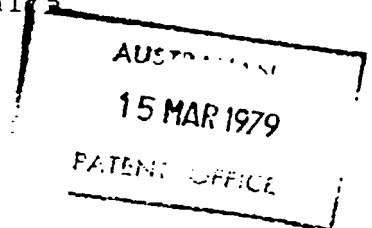
Class Int. Class



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Complete Specification for the invention entitled:

"ELECTRICAL SWITCHBOARD STRUCTURE"

The following statement is a full description of this invention, including the best method of performing it known to me/us

This invention relates to electrical switchboards.

5 An electrical failure can occur in a switchboard due to insulation failure or ingress of foreign matter or for other reasons. Such a breakdown of insulation is usually accompanied by arcing and is commonly known as an arcing short circuit or arcing fault.

10 Modern switchboards can have their electrical equipment such as circuit breakers, starters, switches etc., mounted in separated compartments for ease of maintenance and to inhibit the propagation of arcing faults from one compartment to another.

15 If the short circuit power available from the electricity supply system is sufficiently high at the point of failure, then an arcing fault is accompanied by enormous liberation of energy. An electrical "explosion" occurs with sudden increase in pressure within the compartment and the instantaneous
20 emission of flame smoke, hot ionized gases and metal vapour. Modern switchboards can be designed with sealed compartments vented to chimneys or other exhausts to allow pressure relief from the compartments and they may be fitted with doors which are sufficiently strong
25 and adequately fixed to prevent distortion which might allow the escape of flames and gases in sufficient

quantity to endanger an operator standing in front
of the switchboard. However, one major problem with
such switchboards is that the flame and hot gases
impinge on the rubber door seals and can burn through
these seals very rapidly. The present invention
provides a simple but effective means whereby this
problem can be alleviated. It also provides,
according to an optional but preferred feature, a
most effective quick release device for holding a
switchboard door in its closed position.

According to the invention there is provided
an electrical switchboard structure comprising

a casing structure having at least one open-
fronted compartment;

a door to cover the front of the compartment
and thereby to close the compartment;

resilient sealing means fitted to the door
so as to engage the casing structure about the mouth
of the compartment whereby to seal the compartment
when closed by the door;

casing flange means fixed relative to the
casing structure to extend around the mouth of the
compartment and to project forwardly therefrom; and

door flange means projecting inwardly of
the door such that, when the door is closed, the door
flange means extends around the mouth of the compartment

in closely spaced, overlapping relation with the casing flange means between said sealing means and the compartment whereby to shield ^{in use,} the sealing means ~~flame or hot gases generated when an electrical explosion occurs within~~ from direct exposure to the compartment.

5 Preferably the door flange means encompasses the casing flange means when the door is closed.

The door flange means may serve as a laterally inner side wall of a peripherally extending channel on the door to receive the sealing means.

10 The door may be hinged to the casing structure.

The compartment and the door may be generally rectangular, in which case the casing flange means and the door flange means will each
15 comprise four flange segments extending one along each of the four sides of the mouth of the compartment. At least one of the casing flange segments may have a laterally inturned forward edge margin and the door may be fitted with manually actuatable catch means to
20 co-operate with that edge margin to provide a quick release door fastener.

Said casing flange edge margin may have a plurality of longitudinally spaced edge notches and the catch means may be comprised of a catch bar
25 mounted on the door for longitudinal sliding movement between a position in which catch portions of the

catch bar register with the casing flange edge margin at locations between said notches so as to hold the door closed and a position in which said catch portions of the catch bar register with said notches to release the door for opening movement.

In order that the invention may be more fully explained, some specific embodiments thereof will be described in some detail with reference to the accompanying drawing, in which:-

Figure 1 is a horizontal cross-section through part of a switchboard constructed in accordance with the invention;

Figure 2 is a vertical cross-section through part of a modified switchboard provided with a quick-release door fastening mechanism in accordance with a preferred feature of the invention;

Figure 3 illustrates components of the quick release door fastening mechanism of the switchboard shown in Figure 2;

Figure 4 is a horizontal cross-section through the door fastening mechanism in its release position;

Figure 5 is a horizontal cross-section through the door fastening mechanism in its locked position; and

Figure 6 is a vertical cross-section through a slightly modified version of the door fastening mechanism.

Figure 1 shows part of an electrical

switchboard comprising a casing structure denoted generally as 11 having a number of open-fronted compartments 12 which can be closed by doors 13 hinged to the casing structure by hinges 10.

5 Casing structure 11 is made up of sheet metal components. It comprises a back panel (not shown) to carry the electrical components to be installed in the switchboard and partition walls 14 projecting forwardly from the back panel to divide
10 the board into the rectangular compartments 12.

Figure 1 shows only two of the vertical partition walls 14 bolted to vertical mullions 15 by bolts 16 and nuts 17 but similar horizontal partition walls are bolted to horizontal mullions.

15 Each door 13 is comprised of flat rectangular steel sheet provided with an inturned peripheral skirt 18. One leaf of each of the hinges
10 is welded to skirt 18 down the left hand side of the door (as seen in Figure 1). The other leaf of
20 each hinge is fastened to the appropriate vertical mullion 15 by vertically spaced set screws 19 and nuts 20. The door is mounted by hinges 10 so as to swing between the position shown in full lines in Figure 1 in which it closes the respective compartment to a fully opened
25 position indicated by the broken lines 13A in Figure 1.

Each door carries a neoprene foam rubber

seal 22 to engage the vertical and horizontal mullions of the casing structure around the mouth of the compartment 12 which is closed by the door, thereby to seal the compartment. Seal 22 is in the form of a strip of generally rectangular cross-section and of hollow rectangular shape to suit the mouth of the compartment. It fits into a channel 23 formed on the inner side of the door. Down the left hand vertical side of the door, channel 23 is formed by a pair of angle sections 24, 25 welded to the inner face of the door. Along the other three sides of the door the channel 23 may be formed between angle sections 24A and the peripheral skirt 18 of the door.

Although generally of rectangular cross-section to fit channel 23, sealing strip 22 has a laterally outwardly projecting peripheral rim portion 26 which, when the door is closed, is tightly compressed between the mullions of the casing structure and the outer wall of the seal-retaining channel (i.e. door skirt 18 along three sides and the inwardly projecting flange of angle section 25 in the case of the left hand vertical side). This tight compression of the rim portion 26 of the seal enhances the effectiveness of the seal.

In accordance with the present invention the walls 14 of casing structure 11 are extended to

form flanges 27 which project forwardly from the open mouths of compartments 12 immediately within the inner wall of the seal retaining channel 23 defined by the inwardly projecting flange 28 of angle section 24 and the corresponding flanges 28A of sections 24A. When the door is closed the flanges 27 overlap flanges 28, 28A in closely spaced relationship to shield the sealing strip from direct exposure to compartment 12. Hot gases and flames due to an electrical fault within the compartment 12 can only reach seal 22 by passing through a tortuous labyrinth passage 40 defined between flanges 27 and angle sections 24, 24A. The spacing between the respective flanges may be so small and the length of the overlap such that the labyrinth barrier is sufficient to prevent significant damage of the seals during service. The gap between flanges 27 and 28, 28A may be less than 5 mm and is preferably of the order of 1 to 2 mm. The length of the overlap between the respective flanges may be greater than 10 mm and is preferably of the order of 20 mm or greater.

In the switchboard illustrated in Figure 1 each door 13 is held closed by a series of knurled-head screws 29 extended through holes in the right hand margin of the door to screw into nuts 30 fitted

to the casing structure. As illustrated, nuts 30 may be mounted on angle brackets 31 fastened to the adjacent vertical mullion 15 by the bolts 16 and nuts 17 which also fasten the adjacent side wall 14 to the mullion.

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The door fastening screws of the switchboard illustrated in Figure 1 are most effective and enable the door seals to be tightly compressed, but the necessity to undo these screws individually in order to open the door can be inconvenient. Figures 2 to 5 illustrate a quick-release door fastener which is more convenient in operation and which can be provided in association with the labyrinth seal protection feature.

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Figure 2 shows the upper horizontal mullion 41 of one of the switchboard compartments to which a top wall 42 of the compartment is attached. The door is denoted as 43 and carries a rubber seal 44 similar to the seal 22 of the previous embodiment. Seal 44 is located in a channel 45 defined between an outer peripheral skirt of the door and angle sections 47 fastened to the inner face of the door within the skirt. In accordance with the present invention wall 42 is extended to form a forwardly projecting flange 48 which overlaps the inwardly projecting flange of angle section 47 to provide labyrinth protection for

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the seal. In this case, however, the forward end of flange 48 is turned laterally inwardly of the compartment so as to form a flange edge margin 49 which is generally parallel to the inner face of the door when the door is closed. This edge margin 49 is provided with a series of edge notches 50 illustrated in Figure 3.

Door 43 is fitted with a sheet metal catch bar 51 extending across the upper inner side of the door and mounted for longitudinal sliding movement by means of a lower edge retaining strip 52 and a handle 53 which extends through a horizontal slot in the door.

Catch bar 51 is made of a single sheet of strip steel the upper margin of which is slit and pressed to form two laterally spaced and longitudinally staggered sets of upwardly projecting tongues 54, 55. The front set of tongues 54 slide against the inner face of the door and the outer set of tongues can be moved by longitudinal sliding movement of catch bar 51 between the positions shown in Figure 5, in which they register behind the tongues of flange margin 49 between notches 50 to lock the door, and the position shown in Figure 4 in which they register with notches 50 to permit the door to be opened. The arrows in Figure 4 indicate the direction of movement of the catch bar from its release position to its locking position.

The quick-release mechanism illustrated

in Figures 2 to 5 enables the door to be securely held at a number of points whilst also providing the labyrinth protection for the seal 44. There may be a pair of such quick release mechanisms mounted one at the top and one at the bottom of the door, the labyrinth seals at the two sides of the door being similar to those in the previous embodiment illustrated in Figure 1.

Figure 6 illustrates a modified version of the quick-release mechanism in which the catch bar 51 is retained against the inner face of the door by means of a retaining strip 56 disposed at the top of the catch bar rather than at the bottom as in Figure 2.

The illustrated switchboard constructions have been advanced by way of example only and could be varied considerably. For example the flange means of the door which forms part of the labyrinth barrier when the door is closed need not necessarily be part of the channel which holds the seal and a separate labyrinth-forming flange could be provided. Moreover this flange could be formed integrally with the door. Similarly the casing flange means could be formed in various ways, for example by separate flange strips attached to the mullions or some other part of the casing structure. It is accordingly to be understood

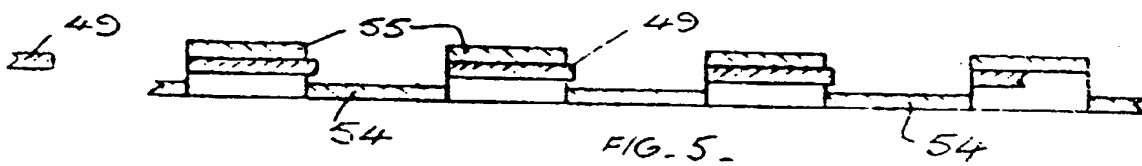
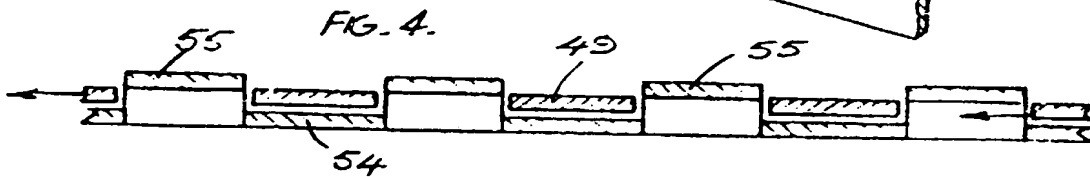
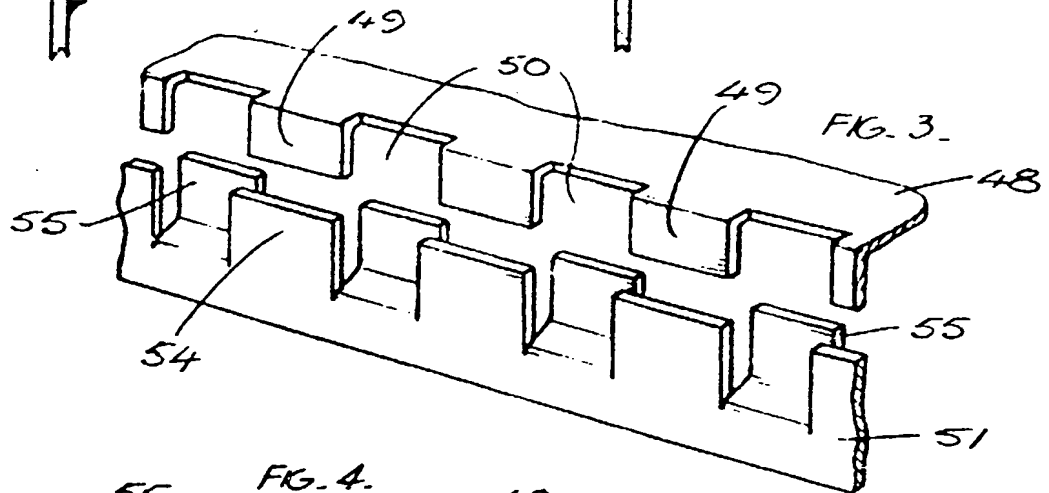
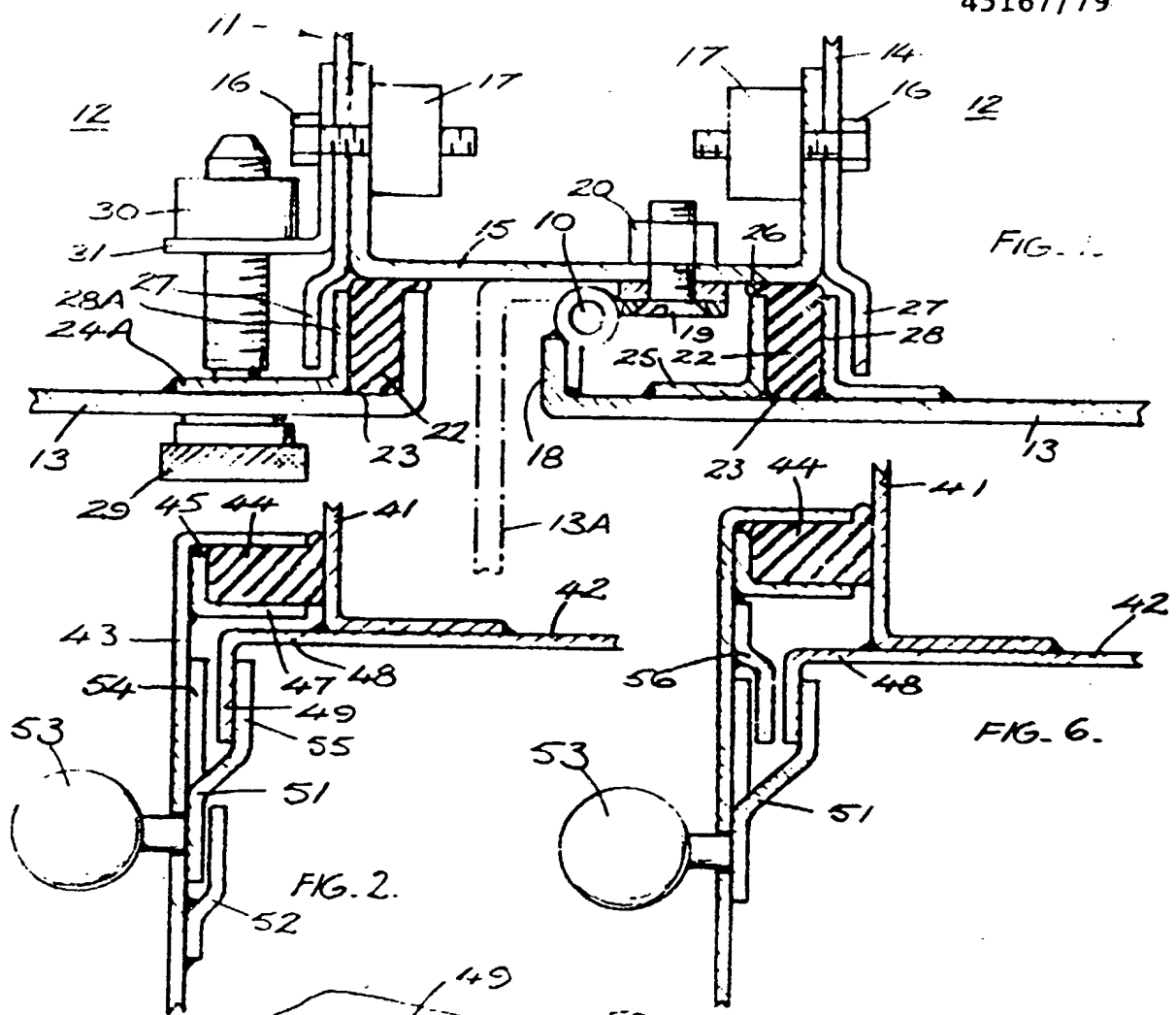
the the invention is in no way limited to the details of the illustrated constructions and that many modifications and variations will fall within the scope of the appended claims.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An electrical switchboard structure comprising
a casing structure having at least one open-fronted compartment;
a door to cover the front of the compartment and thereby to close the compartment;
resilient sealing means fitted to the door so as to engage the casing structure about the mouth of the compartment whereby to seal the compartment when closed by the door;
casing flange means fixed relative to the casing structure to extend around the mouth of the compartment and to project forwardly therefrom; and
door flange means projecting inwardly of the door such that, when the door is closed, the door flange means extends around the mouth of the compartment in closely spaced, overlapping relation with the casing flange means between said sealing means and the compartment whereby to shield the sealing means from direct exposure to the compartment.
in use, flame or hot gases generated when an electrical explosion occurs within
2. An electrical switchboard structure as claimed in claim 1, wherein the spacing between the door flange means and the casing flange means is less than 5 mm.

3. An electrical switchboard structure as claimed in claim 2, wherein said spacing is in the range 1 to 2 mm.
4. An electrical switchboard structure as claimed in any one of the preceding claims, wherein the length of overlap between the door flange means and the casing flange means is greater than 10 mm.
5. An electrical switchboard structure as claimed in claim 4, wherein said length of overlap is at least 20 mm.
6. An electrical switchboard structure as claimed in any one of the preceding claims, wherein the door flange means encompasses the casing flange means when the door is closed.
7. An electrical switchboard structure as claimed in claim 6, wherein the door flange means serves as a laterally inner side wall of a peripherally extending channel on the door to receive the sealing means.
8. An electrical switchboard structure as claimed in claim 7, wherein the sealing means comprises a strip of resiliently compressable material of generally rectangular cross-section.

9. An electrical switchboard structure as claimed in any one of the preceding claims, wherein the door is hinged to the casing structure.
10. An electrical switchboard structure as claimed in any one of the preceding claims, wherein the door is generally rectangular and the casing flange means and the door flange means each comprises four flange segments extending one along each of the four sides of the mouth of the compartment.
11. An electrical switchboard structure as claimed in claim 10, wherein at least one of the casing flange segments has a laterally inturned forward edge margin and the door is fitted with manually actuable catch means to co-operate with that edge margin to provide a quick release door fastener.
12. An electrical switchboard structure as claimed in claim 11, wherein said casing flange edge margin has a plurality of longitudinally spaced edge notches and the catch means is comprised of a catch bar mounted on the door for longitudinal sliding movement between a position in which catch portions of the catch bar register



with the casing flange edge margin at locations between said notches so as to hold the door closed and a position in which said catch portions of the catch bar register with said notches to release the door for opening movement.

13. An electrical switchboard structure, substantially as hereinbefore described with reference to Figure 1, or with reference to Figures 2 to 5 or with reference to Figure 6 of the accompanying drawing.

DATED this 14th day of MARCH, 1979

BARKER & TAYLOR PTY. LTD.

By its Patent Attorneys:

CLEMENT HACK & CO.

Fellows Institute of Patent Attorneys of Australia